DERWENT-ACC-NO: **1968-90364P**

DERWENT-WEEK: 196800

TITLE: Control of vulcanisation temp in tyre production

PATENT-ASSIGNEE: GOODYEAR TIRE & RUBBER CO[GOOD]

PRIORITY-DATA: 1963US-0276746 (April 30, 1963)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
DE 1248917 B		N/A	000	N/A
CA 781210 A		N/A	000	N/A

ABSTRACTED-PUB-NO: DE 1248917B

BASIC-ABSTRACT:

Control of vulcanisation temp., particularly in tyre prodn., by applying a colour layer capable of changing colour, i.e. blackening or charring, when attaining the correct vulcanisation temp., and another colour layer similarly indicating the attainment of a temp. in excess of the correct vulcanisation temp., to the tyre.

Reliable temp. control, directly on the article; the colour indication remains practically invisible on the outside of the finished (vulcanized) article.

TITLE-TERMS: CONTROL VULCANISATION TEMPERATURE TYRE PRODUCE

DERWENT-CLASS: A00

CPI-CODES: A09-D; A11-C02; A12-T01;

Another system of checking temperature is often employed wherein the temperature indicating material is in stick form and a mark therefrom is placed in or on the mold. The material then undergoes a color change or transformation when the desired temperature is surpassed. This method requires extra effort by the operator and if the mark is inside the mold it will be destroyed by subsequent mold use. Associated with temperature indicating substances that undergo a color change is the fact that the mark may not be discernible to persons who are color blind.

Therefore, there exists a need for a rapid, simple and inexpensive method of checking the temperature to which the cured tire or article has been subjected. Such a requirement for a simple assurance that the optimum curing temperature has been attained is particularly important to the commercial retreading shop since they are not, in general, equipped to make exacting and time-consuming temperature checks. There is also the problem that a small retread shop usually cannot afford the expense of having the monitoring equipment on hand, much less the expense of a specialist to conduct the tests.

It is very important that any device used to check mold temperatures will interfere as little as possible with the repeated use of the mold and the curing of the tire placed therein. In addition, the device should not be such that the mold becomes soiled or contaminated during the temperature check. Mold cleaning is both expensive and time-consuming from a labor standpoint and also results in the loss of mold production time. The device and method of employing the present invention successfully avoids the above-mentioned problems and provides a simple, inexpensive means of determining temperatures associated with tire curing. Of particular

value is the fact that the temperature indicating means of this invention is situated on the actual tire rubber; therefore, the indicator remains with the tire even after it has been disassociated with the mold. Then, too, the present technique provides a continuous temperature indicating mark around the entire tire carcass. This, of course, is not to be taken as a necessary limitation. The temperature indicator could also be placed around the tire in an intermittent fashion such as a series of dots or dashes. Also, the entire tread surface could be sprayed, thus enabling the operator to detect an uncured spot regardless of location.

It is a primary object of the present invention to provide a strip of tread rubber containing thereon a mark that will indicate that a specific temperature has been attained.

Another object of the invention is to provide a temperature indicating device that will give a temperature check around the entire periphery of a tire.

An additional object of this invention is to provide a device for indicating the temperature without the utilization of complex apparatus.

Another object of the present invention is to provide a temperature indicator that will be essentially invisible on a tire exterior after it has passed through its temperature indicating phase.

A further object of this invention is to provide a means of marking the rubber stock at the time it is extruded.

These and other objects of the present invention will become apparent from the following description and drawings in which:

Fig. 1 is a typical pneumatic tire showing the device of the invention before cure;

Fig. 2 is a perspective view of the tread rubber stock as it is manufactured;

Fig. 3 shows a cold spot in an ordinary curing mold;

Fig. 4 is a section of a tire cured in the mold of Figure 3;

Fig. 5 is a cross-section taken along lines 5-5 of Fig. 4 which shows a defective cure; and

Fig. 6 is a cross-section taken along lines 6-6 of Fig. 4 and shows therein a properly cured tire.

The use of the present invention can be easily understood by reference to Fig. 1 which shows a tire 10 and its exterior tread area 11. The area between the edge of the tread 12 and sidewall 13 is known as shoulder area 14. On shoulder area 14 is shown the preferred location of temperature indicator strip 15. Strip 15 can be a variety of substances that are supplied by paint manufacturers specializing in the heat indicator field. Indicators can be furnished which alter their color at practically any ordinarily desired temperature. The indicating medium, which generally is a paint or dye possessing either reversible or irreversible color characteristics should be one that is not detrimental to rubber products either in the cured or uncured state. Furthermore, the color change or transformation should be such that the end color blends in with the tire carcass so as to render it for all practical purposes invisible.

Fig. 2 shows in perspective a strip of rubber stock 20 in the flat pattern as it is commonly extruded prior to incorporation in a tire or for use in recapping a worn tire. The area 21 represents the area that eventually is forced into the mold or matrix, thus forming the tire tread. Area 22 forms the shoulder area in the finished tire. Temperature

indicator strip 15 is positioned on rubber stock 20 so that it will fall in the shoulder area of the finished tire. While area 22 is the most desirable location for incorporation of temperature indicator strip 15, as will hereinafter be explained, it is to be understood that strip 15 can be also incorporated on other sections of the rubber stock such as center line 23.

Fig. 3 shows a typical tire mold or matrix 24 utilized in curing a retreaded tire casing. The mold contains means for supplying heat to the exterior of the tire. Heat is also supplied to the tire interior by means of a conventional steam filled curing bag which need not be discussed further herein. The matrix can be steam heated and, if so, cold spots or areas 25 can develop because of condensate forming within the core; also, defective circulation can result in an area that is not up to the required temperature. Then, too, electrically heating matrices can generate cold spots because of buckled internal wires or other impairments in the circuitry.

Fig. 4 shows a fragmentary portion of a tire 26 cured in a mold such as that shown in Fig. 3. The uncured area resulting from cold spot 25 cannot be detected except for temperature indicator strip 15 which offers a positive means of identifying the area that is uncured. Fig. 4 also reveals the versatility of temperature indicator strip 15. The matrix such as 24 will form a tread surface 27 that may contain an irregular surface such as depressions 28. Strip 15, because it remains plastic and flexible, will follow the irregularities and act to relay pictorially whether the tread is cured at all points regardless of design.

Fig. 5 is a cross-section taken along line 5-5 through the uncured section of Fig. 4. The molded rubber tread stock

is shown at 29. The original tread on carcass 30 has been removed from line 31 radially outward. Inclusions or gas bubbles 32 along the inner edge of tread stock 29 are caused by insufficient cure.

Figure 6 is a cross section taken along line 6-6 of Fig. 4. The rubber exhibits no gas bubbles because the cure has been adequate.

When rubber stock 20 is initially produced it is extruded from a conventional rubber extrusion die. Immediately thereafter markings such as the center line 23 are printed on the surface of the rubber by dispensing means employing a continuous rolling disk. Strip 15 can likewise be placed on the desired location by means of a rolling dispensing means. The indicating medium is carried by a solvent which aids in forming an uninterrupted path upon rubber stock 20.

In actual practice this invention is used in the following manner. The temperature indicator 15 is applied as a part of the initial production of the rubber stock. The rubber stock is then cut into proper lengths for use in new tires or is rolled into a convenient roll which is then sent to retreaders who cut a particular length depending upon tire size. The cut lengths of tread stock are then applied to a tire carcass and then placed in a mold for curing. The temperature indicator strip 15 is preferably placed on the shoulder area of the tire because this area can be expected to remain at the lowest temperature during the curing cycle. This is particularly so in the retreading of tires where it is desirable to not overheat the original tire carcass. When the desired temperature is attained, the temperature indicator will pass through its transition temperature so that when the cured tire is removed from the mold the strip will no longer

be visible provided the desired cure temperature has been met within the mold. It is, of course, understood that proper pressure must be maintained within the tire; also, the tire must remain within the mold for a time sufficient to cure.

Thus, it can be seen that if the tire has not been sufficiently cured due to lack of mold temperature the temperature strip 15 will still be visible. Since strip 15 is preferably located on the tire in a continuous path, any uncured segment will be readily ascertainable. Strip 15 is of particular value in that it assures the operator that the tire or curing mold itself has been at the cure temperature. If the mark or indicator is placed on the mold it will indicate mold temperature but not necessarily tire temperature. Another advantage is that since the mark is on the tire it furnishes proof of cure temperature that is retained by each tire. Heretofore, a mark placed on the mold or recorded by electrical means did not follow the actual cured product as does the indicator of the present invention. This is of particular value since any person independent of the operator can immediately ascertain whether a particular tire has been properly cured at all locations thereon.

Another problem that has plagued the suppliers of rubber stock has been the fact that once the product has left their control it has been exceedingly difficult to know whether the product has been used according to instructions. This invention now allows the manufacturer to tell whether the rubber was cured at or below a minimum or above a maximum specified temperature. When a minimum or maximum temperature is monitored, two strips of temperature indicating material, each having a different critical melting point, would have to be used.

While certain representative embodiments and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in this art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

781210

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In combination, a strip of uncured rubber stock intended to be used to form the tread of a tire and a temperature indicating mark integrally united with a finite width and length of surface of said strip, which surface is to be an exposed surface of said tire, said mark comprising material having a color transition temperature selected to suit the cure temperature of said uncured rubber stock.

2. The combination of Claim 1 wherein said material has a color transition effect such that it is rendered substantially visually undetectable when said rubber stock has been sufficiently cured and such that persistance of visibility of said mark is warning that said tire comprising said rubber stock is insufficiently cured.

3. The combination of Claim 2 wherein a second mark integrally united with the said surface of uncured rubber strip comprises a material having a color transition effect such that its color transition provides visible warning of excessive temperature and overcure.

4. The combination of Claim 2 wherein said mark extends in length sufficient to encompass the periphery of said tire.

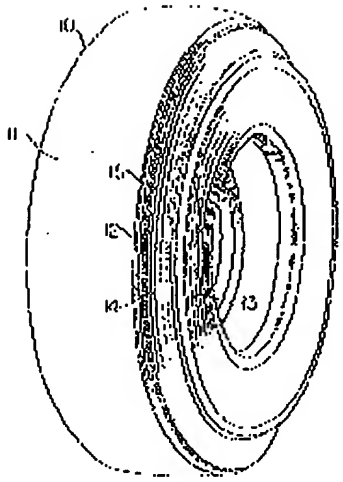

FIG. 1

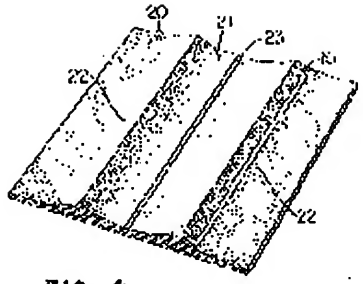

FIG. 2

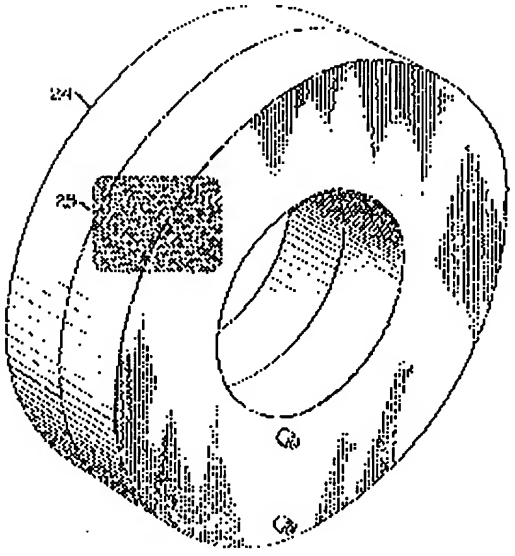

FIG. 3

INVENTOR:
Paul S. Russell

PATENT AGENT:
Kennedy & Schlueter
{}

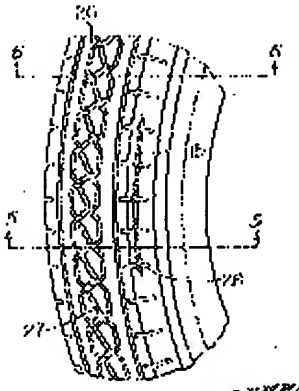

FIG. 4

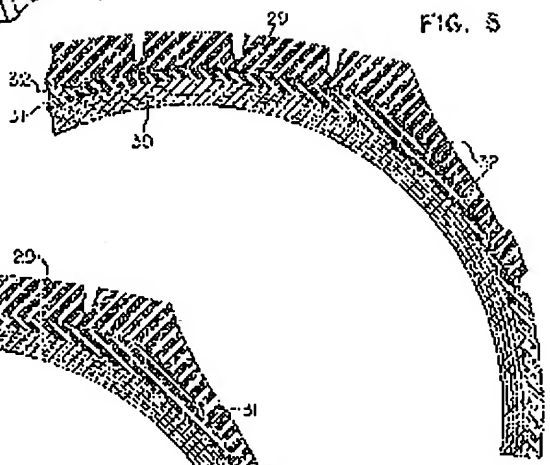

FIG. 5

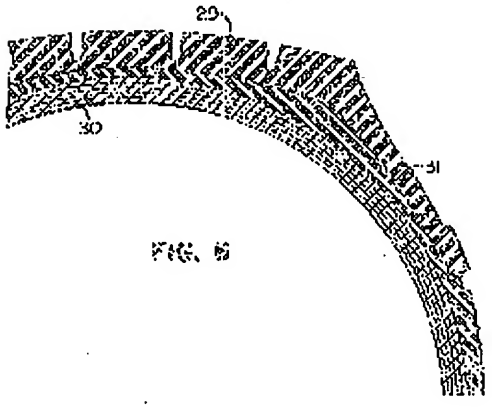

FIG. 6

This Page is inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLORED OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REPERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.
As rescanning documents *will not* correct images problems checked, please do not report the problems to the IFW Image Problem Mailbox